Published in final edited form as:
Appetite. 2012 June ; 58(3): 1113–1117. doi:10.1016/j.appet.2012.02.056.

Children and Eating: Personality and Gender are Associated with Obesogenic Food Consumption and Overweight in 6- to 12-Year-Olds

Margarete E. Vollrath[a,b,*], **Sarah E. Hampson**[c], and **Pétur B. Júlíusson**[d]

[a]Norwegian Institute of Public Health, Department of Psychosomatics and Health Behavior, Division of Mental Health, P.O. Box 1094 Nydalen, Oslo, Norway

[b]Psychological Institute, University of Norway, P.O. Box 1094 Blindern, Oslo, Norway

[c]Oregon Research Institute, 1715 Franklin Blvd., Eugene, OR 97403, USA

[d]Department of Clinical Medicine, Section of Pediatrics, University of Bergen, 5021 Bergen, Norway

Abstract

The role of children's personality traits in the consumption of potentially obesogenic foods was investigated in a sample of Norwegian children aged 6–12 years (N = 327, 170 boys, 157 girls). Mothers rated their child's personality on the traits of the Five Factor Model (i.e., Extraversion, Benevolence, Conscientiousness, Neuroticism, and Imagination). Mothers also completed a food frequency questionnaire assessing their child's consumption of sweet drinks, sweet foods, and fruit and vegetables, and reported their child's height and weight. Controlling for age and mothers' education, boys and girls who were less benevolent consumed more sweet drinks, and girls who were less conscientious and more neurotic consumed more sweet drinks. Boys and girls who were more benevolent and imaginative consumed more fruits and vegetables, and boys who were more extraverted, more conscientious, and less neurotic consumed more fruits and vegetables. Controlling for maternal education, boys and girls who were less extraverted, and girls who were less benevolent, less conscientious, and more neurotic were more likely to be overweight or obese. These findings suggest that children's personality traits play an important yet understudied role in their diet. Further investigation of mechanisms that relate child traits to obesogenic eating and overweight would be valuable.

Keywords

Eating; diet; food consumption; weight; obesity; personality; temperament; behavior problems; gender; children

[*]Corresponding author MEV: mavo@fhi.no.
E-mail addresses:
SEH: sarah@ori.org
PBJ: petur.juliusson@med.uib.no

Introduction

Childhood obesity has been increasing rapidly worldwide, and in Norway 9–18.6% of 2 to 19-year-olds are now overweight or obese (Adair, 2008; Juliusson, 2010). Parental risk factors for childhood obesity include negligent and inconsistent parenting and over-controlling feeding styles (Brown, Ogden, Vögele, & Gibson, 2008; Faith & Kerns, 2005; Gregory, Paxton, & Brozovic, 2011; Patrick & Nicklas, 2005; Ventura & Birch, 2008). Less attention has been paid to the child's own characteristics. However, infants and young children with difficult temperaments (e.g., negative emotionality, poor impulse control) are at higher risk for obesity (Agras, Hammer, McNicholas, & Kraemer, 2004; Braet, Claus, Verbeken, & Van Vlierberghe, 2007; Holtkamp, et al., 2004), they are more likely to be fussy eaters (Haycraft, Farrow, Meyer, Powell, & Blissett, 2011), and they are more likely to eat potentially obesogenic foods (Vereecken, Rovner, & Maes, 2010; Vollrath, Tonstad, Rothbart, & Hampson, 2012). In contrast, children with surgent or extraverted traits are more likely to eat fruit and vegetables, which may protect against obesity (Vereecken et al., 2010; Vollrath et al., 2012).

Personality traits originate in the biologically-based temperament differences that can be observed in babies, infants, and toddlers. They encompass broad, pervasive dispositions to think, feel, and act in characteristic ways across a large spectrum of situations. From about the age of 5 years, personality traits can be measured by parental ratings of the five broad personality dimensions (Extraversion, Agreeableness/Benevolence, Conscientiousness, Neuroticism, and Intellect/Imagination) that constitute the widely accepted Five Factor Model (FFM) of personality (Digman, 1990; John, Caspi, Robins, Moffitt, & Stouthammer-Loeber, 1994). Research relating FFM traits to children's diets and weight is sparse. Low Conscientiousness (impulsivity, low self-regulation) has been associated with a high body mass index (BMI) in children (Braet, 2005; Braet et al., 2007; Datar, 2004) and adolescent girls (Batterink, Yokum, & Stice, 2010). Low Agreeableness combined with low Conscientiousness (i.e., high Psychoticism) was associated with eating unhealthy foods, and low Neuroticism was associated with eating healthy foods in children aged 11–15 years (MacNicol, Murray, & Austin, 2003). The lack of studies using current state-of-the-art personality assessment techniques with primary school children indicates an important gap in scientific knowledge about potential influences on the development of obesogenic eating habits in childhood.

Another individual difference that is rarely considered in the study of children's dietary patterns is gender. There are modest gender differences on preadolescent children's FFM personality traits and temperament traits, with boys tending to be less agreeable/benevolent and less conscientious than girls (De Fruyt & Vollrath, 2003; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Rossier, Quartier, Enescu, & Iselin, 2007; Soto, John, Gosling, & Potter, 2011). Among school-age children, boys report stronger preferences for meat, fish, and poultry, and girls report a stronger preference for fruits and vegetables (Caine-Bish & Scheule, 2009; Cooke & Wardle, 2005). Several studies indicate that boys' diets are less healthful than girls' (Al Sabbah, Vereecken, Kolsteren, Abdeen, & Maes, 2007; Caine-Bish & Scheule, 2009; Sweeting, 2008).

This study was designed to address the significant gaps in knowledge about personality and gender in relation to school-age, preadolescent children's food consumption and weight status. A balanced diet for primary school children to prevent excess body fat accumulation includes foods rich in dietary fiber and low in sugar and fat (Gidding, Dennison, & Birch, 2006; Johnson, Mander, Jones, Emmett, & Jebb, 2008; Patro & Szajewska, 2010; Sanigorski, Bell, & Swinburn, 2007; U. S. Department of Agriculture, 2011). Moreover, for children in particular, consumption of sweetened drinks appears to be an important risk

factor (Erlanson-Albertsson, 2005; Sanigorski, et al., 2007). Here, we related children's personality traits to their consumption of sweet drinks, sweet foods, and fruits and vegetables to their BMI and weight status. Based on past research (Vereecken, et al., 2010; Vollrath, et al., 2012), we hypothesized that low Agreeableness/Benevolence, low Conscientiousness, and high Neuroticism (i.e., traits relating to aspects of difficult temperament) would be associated with consumption of potentially obesogenic sweet drinks and sweet foods and higher weight, and that high Extraversion and high Conscientiousness would be related to consumption of fruits and vegetables and lower weight. Gender differences in the associations between personality and food consumed were investigated on an exploratory basis. Because children may exert a greater influence over what they eat as they get older, and level of maternal education may influence foods offered to children, child age and maternal education were controlled for in the analyses.

Methods

Participants and Procedure

Participants included 327 children aged 6–12 years (M = 8.7; SD = 2.0) attending six primary schools in different communities in Norway. Boys were slightly overrepresented (52% boys versus 48% girls). The children's mothers were the informants with respect to all variables assessed in this study. Most families were intact, with 85% of the mothers being married or cohabiting, and a mean number of 2.3 children living in the same household (SD = 0.9). More mothers (35.5%) than fathers (27.2%) had completed higher education, i.e., had a university degree based on 3–4 years of study.

Participants were recruited through primary schools. The head teachers distributed the questionnaires to the pupils, who brought them home to their mothers and back to school in a sealed envelope after the mothers had completed them. The schools collected the questionnaires centrally and mailed them back to the researchers. To avoid dependency of data, mothers with more than one child attending the same school were instructed to only provide data on the younger child. Of 385 questionnaires thus distributed, 343 (89%) were returned. The Norwegian Data Inspectorate gave permission for this study.

Measures

Children's personality—Mothers rated their children's personality traits by means of the Hierarchical Personality Inventory for Children (H*i*PIC). The H*i*PIC is an observer-based inventory with excellent psychometric properties that is widely used for the assessment of the FFM in children (De Fruyt & Mervielde, 1998; Mervielde & Asendorpf, 2000; Mervielde & De Fruyt, 1999, 2002). It has been translated for use in Germany (Bleidorn & Ostendorf, 2009), Switzerland (De Fruyt & Vollrath, 2003), Italy (Di Blas, Serafino, & De Fruyt, 2005), and France (Rossier et al., 2007). The Norwegian translation was reviewed by two Norwegian researchers (Margarete E. Vollrath and Svenn Torgersen), and ambiguous content was corrected after discussion with one of the measure's original developers (Filipp De Fruyt). By means of 144 items the H*i*PIC assesses five broad personality traits: Extraversion, Benevolence (corresponding to adult Agreeableness), Neuroticism, Conscientiousness, and Imagination (corresponding to adult Openness to Experience). Each H*i*PIC item refers to a specific overt behavior and is formulated in the third-person singular without negations (for example, [he/she] “is always on the go” – an item of the activity sub-trait belonging to the Extraversion trait). Items are rated on a five-point Likert scale ranging from *uncharacteristic* (1) to *very characteristic* (5). In this study, Cronbach's alphas for the broad trait scales were 0.90 for Extraversion (32 items), 0.98 for Benevolence (40 items), 0.87 for Conscientiousness (32 items), 0.86 for Neuroticism (16 items), and 0.86 for Imagination (24 items).

Children's BMI—We calculated the children's BMI as weight in kg/meters^2 and transformed them into z scores, basing on growth charts for Norwegian children (Juliusson et al., 2009). Children's rates of overweight and obesity were determined according to the standard of the International Task Force for Obesity in Children (Cole, Bellizzi, Flegal, & Dietz, 2000).

Children's consumption of foods and drinks—Mothers reported how often on average the child consumed each of 54 foods and drinks using a 4-point Likert scale. Mothers' reports included school lunch, because Norwegian children eat a packed lunch at school prepared at home. Five items assessed *sweet drinks*: 1. chocolate milk, 2. Coca Cola/ Pepsi Cola or other sweet sodas, 3. artificially sweetened Coca Cola/ Pepsi Cola or sodas, 4. syrup with water, 5. artificially sweetened syrup with water. We included artificially sweetened drinks, because they cause similar endocrine responses as sugar-sweetened drinks (Brown, Walter, & Rother, 2009; Swithers & Davidson, 2008). Scale labels were 0 = *rarely/ never*, 1 = *1–6 glasses per week*, 2 = *1 glass per day*, 3 = *2 glassesper day*, and 4 = *3 or more glasses per day*. A sum score with a range from 0 to 20 was computed across the items where higher scores indicate more drinks consumed but do not equate to actual number of drinks consumed. Four items assessed *sweet foods*: 1. cakes and cookies, 2. candies, jellybeans, and chocolates, 3. ice cream, and 4. sorbet. Scale labels were 0 = *rarely/never*, 1 = *1–3 times per week, 2 =4–6 times per week, 3 = 1 time per day, and 4 =2 times or more per day*. The sum score ranged from 0 to 16. Eight items assessed intake of *fruits and vegetables*: 1. raw carrots, 2. other raw vegetables, 3. cooked vegetables in stews, 4. cooked vegetables as garnish, 5. bananas, 6. apples, 7. oranges, mandarins, other fruits, and 8. berries. The scale labels were the same as for sweet foods. The sum score for fruits and vegetables ranged from 0 to 32.

Mothers' education—Mothers reported their highest level of education on a 6-point Likert scale, where 1 corresponded to 9 years of education (basic school) and 6 corresponded to completion of a 4-year university study or totally 17 or more years of education.

Statistical Analysis

Of originally 343 participants, we excluded 16 where information was missing for the child's sex, age, height or weight, or the responses for the diet items. We substituted missing responses among the HiPIC items by means of the maximum likelihood algorithm in PASW 17 Statistics, using non-missing items as the basis for estimation (SPSS, 2009). This procedure leads to less bias than listwise deletion and preserves sample size and power (Schafer & Graham, 2002). We described the associations among variables (age, maternal education, foods, drinks, BMI z-scores, overweight, and personality scores) by means of Pearson correlations that were stratified for gender. Gender differences in continuous variables were tested by means of univariate analyses of variances. To test the difference of the children's BMI z scores from zero, we used one-sample t-tests. We tested gender differences between correlation coefficients using Fisher's *z*-test.

Results

Girls and boys consumed similar quantities of sweet drinks and fruits or vegetables, but girls ate more sweet foods than boys (Table 1). BMI z-scores indicated that the sample as a whole did not differ from the Norwegian reference sample ($t = 1.50$, $p = 0.13$). However, boys were heavier than the reference sample ($t = 2.13$, p = 0.03), and girls were lighter ($t = -2.10$, $p = 0.04$). Only 2.3% of the children were obese; therefore, this category was subsumed under the category overweight. The proportion of boys who were overweight was

significantly higher than the proportion of girls. Boys' and girls' mean personality scores were similar (within one tenth of a scale point) across all five traits, although girls' scores were significantly higher on Extraversion and Imagination.

After controlling for child age and maternal education, all five of the FFM traits were significantly associated with one or more of the outcomes (Table 2). For the sample as a whole, and for boys and girls separately, lower Benevolence was associated with higher consumption of sweet drinks. For girls, lower Conscientiousness and higher Neuroticism were also associated with consuming more sweet drinks. None of the children's personality traits were associated with eating sweet foods. Four of the five personality traits were associated with eating more fruits and vegetables for the sample as a whole: Extraversion, Benevolence, Conscientiousness and Imagination. For boys, low Neuroticism was also associated with higher intake of fruits and vegetables, whereas in girls, only higher Benevolence and higher Imaginations were associated with fruits and vegetables. The children's personality traits were not associated with their BMI z scores but they were associated with whether or not they were overweight. For the sample as a whole, as well as for boys and girls separately, higher Extraversion was associated with less likelihood of being overweight. In girls, low Benevolence, low Conscientiousness and high Neuroticism were associated with increased likelihood of being overweight. There were no associations between the children's age and their obesogenic diet; however, older children had higher BMI z scores. This indicates that older children in this sample were of relatively higher weight compared to the normative population. Mothers' higher levels of education were associated with lower consumption of sweet drinks and higher consumption of fruits and vegetables for both girls and boys.

Discussion

This study addressed the gaps in knowledge about the association between personality and gender, and potentially obesogenic food consumption and weight, among primary school-age, preadolescent children. The findings indicate that all five of the broad dimensions of personality are associated with aspects of children's obesogenic diet and their overweight. We believe this is the first study to demonstrate these associations for this age group (6–12 years). Our findings suggest that children's personality traits could be an important and pervasive influence on what kinds of foods they consume and on their weight.

Consistent with our initial hypothesis, children with broad personality traits relating to difficult temperament (low Benevolence, low Conscientiousness, and high Neuroticism) were more likely to consume sweet drinks. Sweet drinks may be viewed as supplementary, given between and during meals, and used to soothe and pacify the child as well as to provide nourishment (Stifter, Anzman-Frasca, Birch, & Voegtline, 2011). Findings from a recent study in infants suggest that once the habit of drinking sweet drinks is established, it tends to persist (Vollrath, et al., 2012). However, contrary to our hypothesis, no associations with personality were observed for sweet foods. This may have been due to limitations of the measure, such as failing to adequately represent the variety of sweet foods, particularly sweet desserts, given to children. Girls consumed more sweet foods included in this measure than boys, which may be a result of parental feeding decisions or a gender-based taste preference, or a combination of the two (Liem, Bogers, Dagnelie, & De Graaf, 2006).

As hypothesized, Extraversion, which is related to surgent temperament and approach motivation, was associated with higher consumption of fruits and vegetables, particularly for boys. This is in line with two previous studies (Vereecken, et al., 2010; Vollrath, et al., 2012). Children can have an aversion to the balance of sweet and sour taste in fruits and the bitterness of vegetables (Birch & Fisher, 2008). Those with more outgoing, approach-

oriented traits appear to be more willing to consume these more challenging foods. Also as predicted (McNicol, et al., 2003), more conscientious children, particularly boys, consumed more fruits and vegetables, indicating the importance of self-regulation for good eating habits. Unexpectedly, all three remaining FFM traits were also associated with fruit and vegetable consumption for one or both genders. Boys and girls who were more benevolent and imaginative, and boys who were less neurotic, consumed more of these foods. Considered together, a five-factor profile of higher levels in the more socially desirable direction was related to fruit and vegetable consumption in the entire sample, and particularly so in boys.

For this age group, food consumption is still partly under parental control. However, children's personalities may influence and interact with their parents' behavior, affecting the parents' feeding styles and choice of foods they offer (Gubbels et al., 2009; Horn, Galloway, Webb, & Gagnon, 2011; Vereecken et al., 2010). These transactional processes between parents and children concerning food are also likely to influence the child's weight. Although in this study there were no associations between the child's personality traits and BMI z-scores, there were associations with being categorized as overweight or obese that were consistent with our initial hypotheses. More extraverted girls and boys were less likely to be overweight, which may reflect the higher levels of activity associated with Extraversion as well these children's greater consumption of fruits and vegetables. Less benevolent and less conscientious girls, and more neurotic girls, were more likely to be overweight, and these same traits were associated with girls' consumption of obesogenic sweet drinks (Erlanson-Albertsson, 2005; Sanigorski, et al., 2007). The associations of low Benevolence and low Conscientiousness with overweight status are in line with earlier studies showing higher impulsiveness and lower agreeableness associated with weight status in children and adolescent girls (Batterink, et al., 2010; Braet, 2005; Braet et al., 2007; Datar, 2004). These findings for weight status provide important new evidence of the significance of personality traits for the health of children in this particular understudied age group (6–12 years).

Our findings also indicated important gender differences. Consistent with past findings, girls tended to eat more sweet foods and more fruits and vegetables than boys—the latter finding only being marginally significant (Caine-Bish & Scheule, 2009). Boys with less socially desirable personality traits (i.e., less extraverted, benevolent, conscientious, and imaginative, and more neurotic) ate fewer fruits and vegetables. It is possible that mothers are less willing to engage in confrontations over food with boys than girls. This notion is supported by studies showing that mothers use less controlling feeding practices in boys compared to girls (Gubbels et al., 2011; Tiggemann & Lowes, 2002). However, the boys as a whole in this sample did not have higher levels of “difficult” externalizing traits; indeed, girls were marginally less benevolent than boys, and girls were significantly more extraverted and imaginative.

Limitations

This was a correlational study, so the direction of causality cannot be inferred, and the possibility remains that children's food and weight could be affecting their personality traits (Wiles, Northstone, Emmett, & Lewis, 2009). This question should be resolved by future longitudinal studies. Moreover, height and weight measures were mother-reported and hence not as accurate as objective assessments. Conducting a relatively large number of significance tests may have led to spurious results. Therefore, correlations have to be confirmed in other studies. We did not examine personality effects relative to other known influences on children's food consumption, such as parental feeding styles, which is an important next step for future research in the light of our findings. We did not measure food consumption directly but only indirectly from what mothers reported feeding their child.

More elaborate methods requiring direct observation were beyond the scope of this study but would be valuable in the future to validate the present findings.

Conclusions

Little is known about the relation between personality and food consumption among primary school-age, preadolescent children. This study is the first to demonstrate concurrent associations among personality assessed using the FFM, food consumption, and weight status. Future studies should examine the mechanisms by which children's personality traits may be associated with their eating behaviours, including food preferences, appetite, eating styles and parental feeding practices.

Acknowledgments

This manuscript is dedicated to the memory of Ivan Mervielde (1947–2011). Sarah Hampson's contributions to this manuscript were supported, in part, by grant AG 020048 from the National Institute of Aging, USA. The authors wish to extend special thanks to Jan-Vegard Nilsen, whose graduation thesis at the Psychological Institute of the University of Oslo provided an inspiration and basis for this article. The authors also thank Ellen Russon for her careful editing of the manuscript.

References

Adair LS. Child and adolescent obesity: Epidemiology and developmental perspectives. Physiology & Behavior. 2008; 94:8–16. [PubMed: 18191968]

Agras WS, Hammer LD, McNicholas F, Kraemer HC. Risk factors for childhood overweight: A prospective study from birth to 9.5 years. Journal of Pediatrics. 2004; 145:20–25. [PubMed: 15238901]

Al Sabbah H, Vereecken C, Kolsteren P, Abdeen Z, Maes L. Food habits and physical activity patterns among Palestinian adolescents: Findings from the national study of Palestinian schoolchildren (HBSC-WBG2004). Public Health Nutrition. 2007; 10:739–746. [PubMed: 17381946]

Batterink L, Yokum S, Stice E. Body mass correlates inversely with inhibitory control in response to food among adolescent girls: An fMRI study. NeuroImage. 2010; 52:1696–1703. [PubMed: 20510377]

Birch LL, Fisher JO. Development of eating behaviors among children and adolescents. Pediatrics. 1998; 101(3):539–549. [PubMed: 12224660]

Bleidorn W, Ostendorf F. A Big Five inventory for children and adolescents: The German version of the Hierarchical Personality Inventory for Children (HiPIC). Ein Big Five-Inventar für Kinder und Jugendliche: Die Deutsche Version des Hierarchical Personality Inventory for Children (HiPIC). Diagnostica. 2009; 55(3):160–173.

Braet C. Psychological profile to become and to stay obese. International Journal of Obesity. 2005; 29:S19–S23. [PubMed: 16385746]

Braet C, Claus L, Verbeken S, Van Vlierberghe L. Impulsivity in overweight children. European Child & Adolescent Psychiatry. 2007; 16:473–483. [PubMed: 17876511]

Brown KA, Ogden J, Vögele C, Gibson EL. The role of parental control practices in explaining children's diet and BMI. Appetite. 2008; 50:252–259. [PubMed: 17804116]

Brown RJ, Walter M, Rother KI. Ingestion of diet soda before a glucose load augments glucagon-like peptide-1 secretion. Diabetes Care. 2009; 32:2184–2186. [PubMed: 19808921]

Caine-Bish NL, Scheule B. Gender differences in food preferences of school-aged children and adolescents. Journal of School Health. 2009; 79:532–540. [PubMed: 19840230]

Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: International survey. BMJ. 2000; 320:1240–1245. [PubMed: 10797032]

Cooke LJ, Wardle J. Age and gender differences in children's food preferences. British Journal of Nutrition. 2005; 93:741–746. [PubMed: 15975175]

Datar A. Childhood overweight and parent- and teacher-reported behavior problems. Archives of Pediatric and Adolescent Medicine. 2004; 158:804–810.

De Fruyt F, Mervielde I. The assessment of the Big Five in the Dutch language domain. Psychologica Belgica. 1998; 38:1–22.

De Fruyt F, Vollrath M. Inter-parent agreement on higher and lower level traits in two countries: Effects of parent and child gender. Personality and Individual Differences. 2003; 35:289–301.

Di Blas L, Serafino F, De Fruyt F. La versione italiana del Hierarchical Personality Inventory for Children (HiPIC). Contributo alla validazione e taratura. [The Italian version of the Hierarchical Personality Inventory for Children (HiPIC). A validation study]. Evàlutiva. 2005; 82:41–53.

Digman JM. Personality structure: Emergence of the five-factor model. Annual Review of Psychology. 1990; 41:417–440.

Else-Quest NM, Hyde JS, Goldsmith HH, Van Hulle CA. Gender differences in temperament: A meta-analysis. Psychological Bulletin. 2006; 132:33–72. [PubMed: 16435957]

Erlanson-Albertsson C. Appetite regulation and energy balance. Acta Paediatrica. 2005; 94:40–41.

Faith MS, Kerns J. Infant and child feeding practices and childhood overweight: The role of restriction. Maternal and Child Nutrition. 2005; 1:164–168. [PubMed: 16881896]

Gidding SS, Dennison BA, Birch LL, Daniels SR, Gillman MW, Lichtenstein AH, et al. Dietary recommendations for children and adolescents: A guide for practitioners. Pediatrics. 2006; 117:554–559. Pediatrics Erratum (vol. 118, p. 1323).

Gregory JE, Paxton SJ, Brozovic AM. Maternal feeding practices predict fruit and vegetable consumption in young children: Results of a 12-month longitudinal study. Appetite. 2011; 57:167–172. [PubMed: 21569809]

Gubbels JS, Kremers SPJ, Stafleu A, Dagnelie PC, Goldbohm RA, de Vries NK. Diet-related restrictive parenting practices: Impact on dietary intake of 2-year-old children and interactions with child characteristics. Appetite. 2009; 52:423–429. [PubMed: 19114065]

Gubbels JS, Kremers SPJ, Stafleu A, de Vries SI, Goldbohm RA, Dagnelie PC. Association between parenting practices and children's dietary intake, activity behavior and development of body mass index: The KOALA Birth Cohort Study. International Journal of Behavioral Nutrition and Physical Activity. 2011; 8:18. [PubMed: 21401954]

Haycraft E, Farrow C, Meyer C, Powell F, Blissett J. Relationships between temperament and eating behaviours in young children. Appetite. 2011; 56:689–692. [PubMed: 21316412]

Holtkamp K, Konrad K, Müller B, Neussen N, Herpertz S, Herpertz-Dahlmann B. Overweight and obesity in children with Attention-Deficit/Hyperactivity Disorder. International Journal of Obesity. 2004; 28

Horn MG, Galloway AT, Webb RM, Gagnon SG. The role of child temperament in parental child feeding practices and attitudes using a sibling design. Appetite. 2011; 57:510–516. [PubMed: 21740941]

John OP, Caspi A, Robins RW, Moffitt TE, Stouthammer-Loeber M. The “Little Five”: Exploring the nomological network of the Five-Factor model of personality in adolescent boys. Child Development. 1994; 65:160–178. [PubMed: 8131645]

Johnson L, Mander AP, Jones LR, Emmett PM, Jebb SA. Energy-dense, low-fiber, high-fat dietary pattern is associated with increased fatness in childhood. American Journal of Clinical Nutrition. 2008; 87:846–854. [PubMed: 18400706]

Juliusson PB, Roelants M, Eide GE, Moster D, Juul A, Hauspie R, et al. Growth references for Norwegian children. Tidsskrift for den Norske laegeforening : Tidsskrift for praktisk medicin, ny raekke. 2009; 129:281–286.

Juliusson PB, Eide GE, Roelants M, Waaler PE, Hauspie R, Bjerknes R. Overweight and obesity in Norwegian children: prevalence and socio-demographic risk factors. Acta Paediatrica. 2010; 99:900–905. [PubMed: 20175763]

Liem DG, Bogers RP, Dagnelie PC, De Graaf C. Fruit consumption of boys (8–11 years) is related to preferences for sour taste. Appetite. 2006; 46:93–96. [PubMed: 16360976]

MacNicol SAM, Murray SM, Austin EJ. Relationships between personality, attitudes and dietary behaviour in a group of Scottish adolescents. Personality and Individual Differences. 2003; 35:1753–1764.

Mervielde, I.; Asendorpf, J. Variable centered and person-centered approaches to childhood personality. In: Hampson, S., editor. Advances in personality psychology. Vol. Vol. 1. Routledge; London: 2000. p. 37-76.

Mervielde, I.; De Fruyt, F. Construction of the hierarchical personality inventory for children (HiPIC). In: Deary, IJ.; De Fruyt, F.; Ostendorf, F., editors. Personality psychology in Europe. Vol. Vol. 7. Tilburg University Press; Tilburg: 1999. p. 107-127.

Mervielde, I.; De Fruyt, F. Assessing children's traits with the hierarchial personality inventory for children. In: De Raad, B.; Perugini, M., editors. Big Five assessment. Hogrefe & Huber; Ashland, OH: 2002. p. 129-142.

Patrick H, Nicklas TA. A review of family and social determinants of children's eating patterns and diet quality. Journal of the American College of Nutrition. 2005; 24:83–92. [PubMed: 15798074]

Patro B, Szajewska H. Meal patterns and childhood obesity. Current Opinion in Clinical Nutrition and Metabolic Care. 2010; 13:300–304. [PubMed: 20075720]

Rossier J, Quartier V, Enescu R, Iselin A. Validation of the French version of the hierarchical personality inventory for children (HiPIC): Influence of gender and age on personality traits in 8- to 12-year-olds. European Journal of Psychological Assessment. 2007; 23:125–132.

Sanigorski AM, Bell AC, Swinburn BA. Association of key foods and beverages with obesity in Australian schoolchildren. Public Health Nutrition. 2007; 10:152–157. [PubMed: 17261224]

Schafer JL, Graham JW. Missing data: Our view of the state of the art. Psychological Methods. 2002; 7:147–177. [PubMed: 12090408]

Soto CJ, John OP, Gosling SD, Potter J. Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. Journal of Personality and Social Psychology. 2011; 100:330–348. [PubMed: 21171787]

SPSS. PASW Statistics Version 17.0 for Windows. SPSS Inc; Chicago, IL: 2009.

Stifter CA, Anzman-Frasca S, Birch LL, Voegtline K. Parent use of food to soothe infant/toddler distress and child weight status: An exploratory study. Appetite. 2011; 57:693–699. [PubMed: 21896298]

Sweeting HN. Gendered dimensions of obesity in childhood and adolescence. Nutrition Journal. 2008; 7

Swithers SE, Davidson TL. A role for sweet taste: Calorie predictive relations in energy regulation by rats. Behavioral Neuroscience. 2008; 122:161–173. [PubMed: 18298259]

Tiggemann M, Lowes J. Predictors of maternal control over children's eating behaviour. Appetite. 2002; 39:1–7. [PubMed: 12160560]

U. S. Department of Agriculture. U. S. Department of Health and Human Services. Dietary guidelines for Americans, 2010. U. S. Government Printing Office; Washington, DC: 2011.

Ventura AK, Birch LL. Does parenting affect children's eating and weight status? International Journal of Behavioral Nutrition and Physical Activity. Mar 17.2008 5:15. [PubMed: 18346282]

Vereecken C, Rovner A, Maes L. Associations of parenting styles, parental feeding practices and child characteristics with young children's fruit and vegetable consumption. Appetite. 2010; 55:589–596. [PubMed: 20849895]

Vollrath, M.; Stene-Larsen, K.; Tonstad, S.; Rothbart, MK.; Hampson, SE. Infant temperament prospectively predicts obesogenic diet at 3 and 7 years. 2012. Manuscript submitted for publication

Vollrath ME, Tonstad S, Rothbart MK, Hampson SE. Infant temperament is associated with potentially obesogenic diet at 18 months. International Journal of Pediatric Obesity. 2011; 6:e408–e414. [PubMed: 20854098]

Wiles NJ, Northstone K, Emmett P, Lewis G. `Junk food' diet and childhood behavioural problems: Results from the ALSPAC cohort. European Journal of Clinical Nutrition. 2009; 63:491–498. [PubMed: 18059416]

Highlights

- Children's Big Five personality traits predict eating fattening foods and overweight.
- Associations are partly gender-specific, but independent of age.
- In boys, all the Big Five predict eating fruit and vegetables. In girls, this is true for Imagination and Benevolence.
- In girls, but not boys, Neuroticism is associated with drinking sweet drinks.
- Introverted boys and girls, as well as unbenevolent, unconscientious, and neurotic girls tend to be overweight.

Table 1

Means and Standard Deviations for Diet, Weight, and Personality in the Entire Sample and Tests of Gender Differences on these Variables (Analysis of Variance)

	M			*SD*			*F*	*P*
Child variables	**Boys**	**Girls**	**Girls and boys**	**Boys**	**Girls**	**Girls and boys**		
Diet and weight								
Sweet drinks (range 0–20)	3.3	3.1	3.2	2.1	1.8	2.0	0.2	0.65
Sweet foods (range 0–16)	3.0	3.4	3.2	1.3	1.6	1.5	4.8	0.03
Fruits and vegetables (range 0–32)	16.3	17.4	16.8	5.9	5.2	5.6	2.7	0.10
z-BMI scores	0.2	−0.2	0.1	1.2	1.3	1.3	11.06	0.001
Overweight/Obese[a]	18.5%	10.0%	14.4%				X^2=4.9	0.03
Personality		M			SD		F	
Extraversion	3.7	3.8	3.7	0.5	0.5	0.5	4.4	0.04
Benevolence	3.6	3.5	3.6	0.4	0.4	0.4	2.9	0.09
Conscientiousness	3.3	3.4	3.3	0.4	0.4	0.4	1.2	0.27
Neuroticism	2.4	2.4	2.4	0.6	0.5	0.6	0.5	0.47
Imagination	3.7	3.8	3.7	0.5	0.4	0.5	1.2	0.02

Note. Boys n = 170; girls n = 157; total n = 327.

BMI = Body Mass Index.

[a]According to the definition by the International Task Force for Obesity in Children (Cole et al., 2000).

Table 2

Correlations and Partial Correlations of Child Personality Traits, Child Age and Maternal Education with Diet and Weight for each Gender and the Total Sample

	Sweet drinks[1]			Sweet foods[1]			Fruits and vegetables[1]			BMI z-scores[2]			Overweight[2]		
Child personality	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**	**Boys**	**Girls**	**Total**
Extraversion	.04	−.01	.02	.02	.07	.05	.21**	.13	.19**	−.05	−.12	−.10	−.18*	−.18*	−.19**
Benevolence	−.15*	−.20**	−.16*	−.01	−.04	−.04	.19**	.17*	.16*	−.00	−.09	−.03	−.03	−.19*	−.08
Conscientiousness	−.06	−.21*	−.13	−.01	−.06	−.02	.24**	.09	.17*	−.04	−.15	−.10	−.05	−.18*	−.11
Neuroticism	.00	.19**	.08	.01	.12	.06	−.19**	−.03	−.12	−.08	.02	.02	.05	.27**	.14*
Imagination	.00	−.03	−.02	−.14	.08	−.01	.31**	.21**	.28**	.01	−.12	−.07	−.05	−.14	−.10
Child age	−.01	.03	.02	−.05.	−.03	−.05	−.04	−.10	−.08	.15*	.19*	.18**	.04	.01	.04
Maternal education	−.20**	−.31**	−.24**	.01	.10	.06	.23**	.12	.18**	−.09	−.05	−.07	−.04	.02	.02

Note: Boys n = 170, girls n = 157, total n = 327.

[1]Correlations with personality traits are controlled for child age and maternal education.

[2]Correlations with personality traits are controlled for maternal education.